

VERUS ENGINEERING

AOS Kit and Accessories – Subaru VA WRX Install Manual



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1. Introduction

1.1. Overview: Detailed instructions on installing the Verus Engineering AOS kit, as well as the accessories associated with the AOS kit, for the VA Subaru WRX.

1.2. Difficulty: Moderate

1.3. Time Required: 2-4 hours

1.4. Tools Needed:

- 1.4.1. Impact/Ratchet
- 1.4.2. 10mm Socket
- 1.4.3. 12mm Socket
- 1.4.4. 19mm Deep Socket
- 1.4.5. Extension
- 1.4.6. 3mm Allen Wrench
- 1.4.7. 4mm Allen Wrench
- 1.4.8. Scissors
- 1.4.9. Flathead Screwdriver
- 1.4.10. Phillips Head Screwdriver
- 1.4.11. Side Cuts / Hose cutter
- 1.4.12. Needle Nose Pliers
- 1.4.13. Teflon Tape or Teflon Sealant
- 1.4.14. Tape Measure

**1.5. AOS Kit Components**

- 1.5.1. (1) AOS, Assembled with (4) Desiccant filters and stainless mesh
- 1.5.2. (1) AOS Bracket
- 1.5.3. (18) Inches 3/8" Rubber Hose
- 1.5.4. (72) Inches 1/2" Rubber Hose

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1.5.5. (24) Inches 3/4" Rubber Hose**1.5.6. Hardware Bag**

- 1.5.6.1.** (2) M4x0.7 BHCS (Button Head Cap Screw) x 16mm Long, Stainless
- 1.5.6.2.** (2) M4 Washer, Stainless
- 1.5.6.3.** (5) M6x1.0 BHCS x 16mm Long, Stainless
- 1.5.6.4.** (5) M6 x 12mm OD Washer, Stainless
- 1.5.6.5.** (6) Zip Tie
- 1.5.6.6.** (1) 1/2" to 3/8" Adapter
- 1.5.6.7.** (2) 1/2" to 3/4" Adapter
- 1.5.6.8.** (1) M4x0.7 BHCS x 30mm Long, Stainless
- 1.5.6.9.** (1) M4 Rivet Nut installer tool
- 1.5.6.10.** (2) Heavy Duty M4 Rivet Nut

**1.6. Coolant Add On Kit**

- 1.6.1.** (1) Coolant Plate
- 1.6.2.** (2) Banjo Bolt
- 1.6.3.** (4) Banjo Washer
- 1.6.4.** (2) 5/16" Banjo
- 1.6.5.** (5) Feet coolant hose
- 1.6.6.** (4) M6x1.0 BHCS x 16mm Long, Stainless
- 1.6.7.** (2) M6 x 12mm OD Washer, Stainless
- 1.6.8.** (4) Hose Clamp, 9-16mm
- 1.6.9.** (4) Zip Tie

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**1.7. Drain Back Kit Components**

- 1.7.1. (1) 1/2" Y Fitting
- 1.7.2. (1) AOS Bottom Replacement Plug
- 1.7.3. (1) -6AN to 1/2" Hose Adapter
- 1.7.4. (14) Inches 1/2" Rubber Hose
- 1.7.5. (4) 7.5" Zip Tie
- 1.7.6. (1) #014 Buna O-Ring



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2. Subaru VA WRX AOS install

2.1. Verus Engineering is not responsible for damage to you or your vehicle by following this manual and/or installing Verus Engineering products.

****MAKE SURE THE ENGINE IS COLD BEFORE ATTEMPTING THIS INSTALLATION****

2.2. Start by popping the hood, and removing the engine cover. Release the clips with a flat head screw driver.



2.3. For this install, we have to remove the intercooler if you still have a TMIC (Top Mount Intercooler). Start by removing the **(2) 12mm bolts** that hold the intercooler down.

2.3.1. Loosen the **clamp** on the charge pipe, and throttle body coupler.

2.3.2. Finally, remove the **(2) 12mm intercooler bracket bolts**, and remove the intercooler.

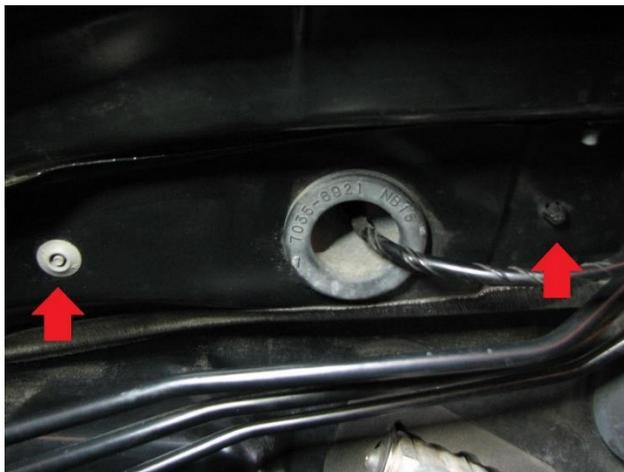
2.3.3. Use the following picture as a guide.

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2.4. We will now begin the installation of the AOS bracket.

2.5. Locate the grommet and harness clip on the passenger side firewall. They are inboard of the shock tower almost directly above the AC lines.



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- 2.6. Remove the grey grommet with a flathead screwdriver, and release the clip with needle nose pliers, and push it through the fire wall. You will be left with two holes that are about 1/4" in diameter.
- 2.7. Install two M4 rivet nuts into the two holes using the instructions below
 - 2.7.1. Insert the M4 X 0.7 installer bolt through the 9/16" hex installer tool, and thread the rivet nut onto the bolt.
 - 2.7.2. Insert the bolt through the hole completely.
 - 2.7.3. Making sure the rivet nut is flat against the fire wall, tighten the M4 installer bolt with a 3mm allen wrench while holding the 9/16" hex installer tool.
 - 2.7.4. Tighten the M4 installer bolt until you feel significant resistance. It should look similar to the picture below. Repeat this process for the other hole.

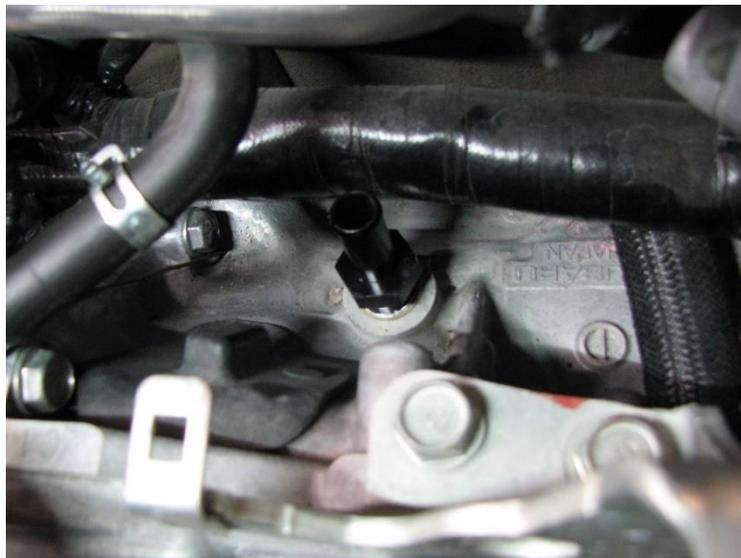


- 2.8. With the rivet nuts installed, we will begin installing the AOS bracket, and AOS assembly.
- 2.9. **If you ARE installing the coolant add on kit skip to step 3.** If you **ARE NOT** installing the coolant add on, simply bolt the mount to the AOS assembly as shown below (ignore the coolant add on shown in the picture below) and continue below. You will be using five 16mm long BHCS, and washers torqued to 6 ft-lbs.

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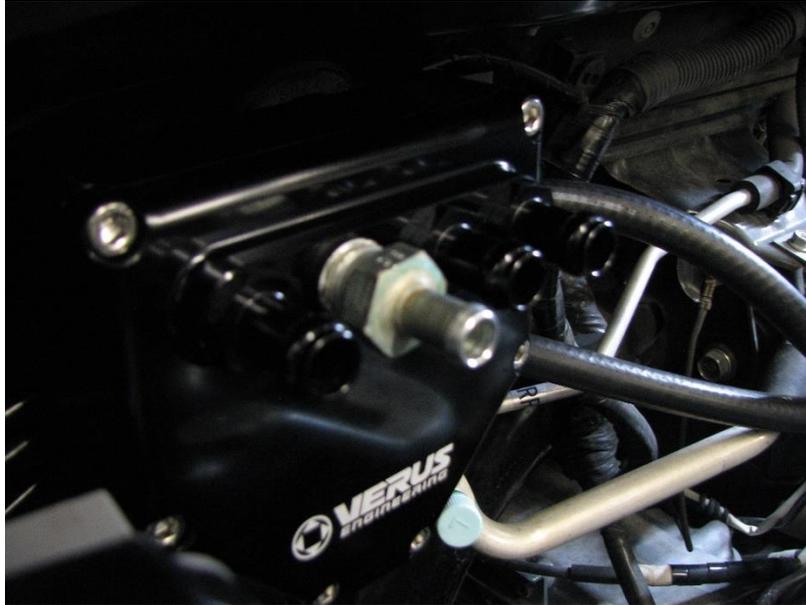
- 2.10.** Install the AOS onto the firewall with the supplied M4 hardware.
- 2.11.** Remove the PCV valve from the engine block using a 19mm deep socket, and replace it with the included NPT to 1/2" barb adapter. Use teflon thread sealer (preferably liquid) on the threads before installing.
- 2.11.1.** The PCV valve is located behind / underneath the intake manifold where the engine block meets the transmission. Look for a big brown electrical connector, and near it you will see the PCV valve with an "L" shaped hose that runs directly into the intake manifold.



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- 2.12.** Install the PCV valve that was previously removed into the open threaded port on the AOS assembly. Use teflon sealant on the threads. ***Note, the PCV valve will not fully thread into the AOS, this is normal.***



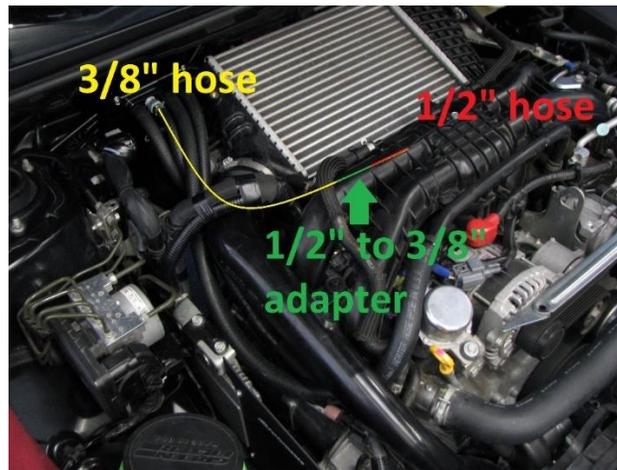
- 2.13.** Now it is time to run the hoses. We will be using the PCV valve, and the 1/2" hose barb on the passenger side of the PCV valve. The hose routing will look something similar to what is shown below. ****Important: Our hose routing may differ from what works best with your set up. ALWAYS verify the correct hose length before cutting.****



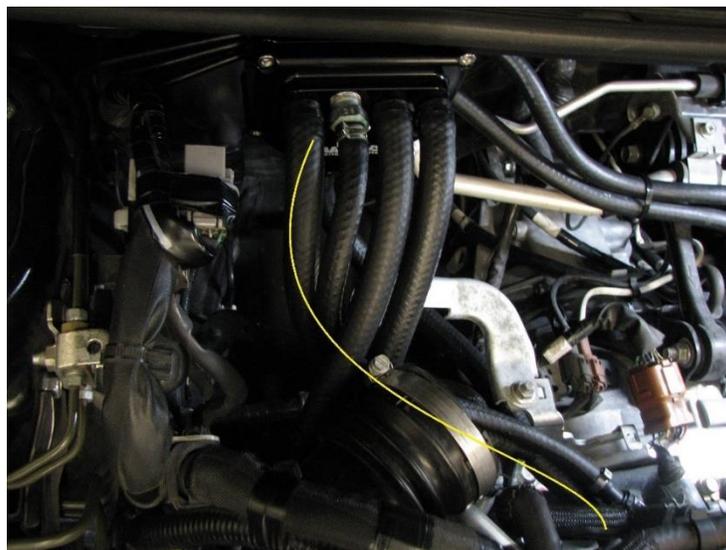
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- 2.14.** Start with the PCV valve first. Connect the 1/2" hose to the barb on the intake manifold. This is the barb that connected the "L" shaped PCV hose we previously removed.
- 2.14.1.** Cut approximately 4" of 1/2" hose.
- 2.14.2.** Connect a 1/2" to 3/8" adapter to the exposed end.
- 2.14.3.** Cut approximately 14.25" of 3/8" hose, and connect it to the adapter.



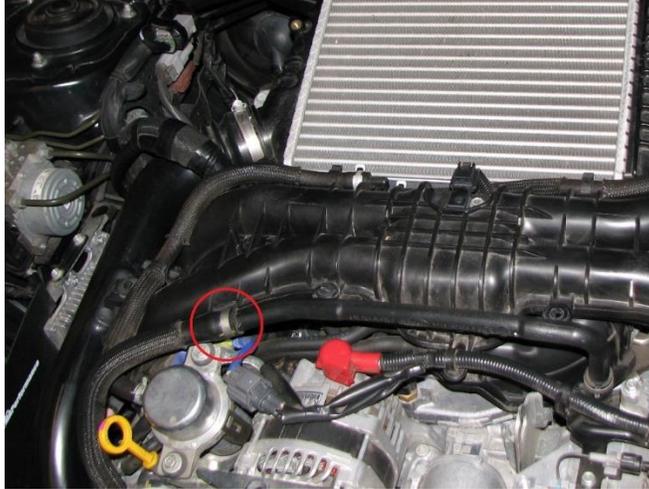
- 2.15.** At this point we will now go into installing the AOS drain back kit in **step 4**. If you **ARE NOT** installing the AOS drain back kit, you may skip to **2.16**.
- 2.16.** Route the furthest left barb directly to the fitting installed in **2.11** with the 1/2" hose.



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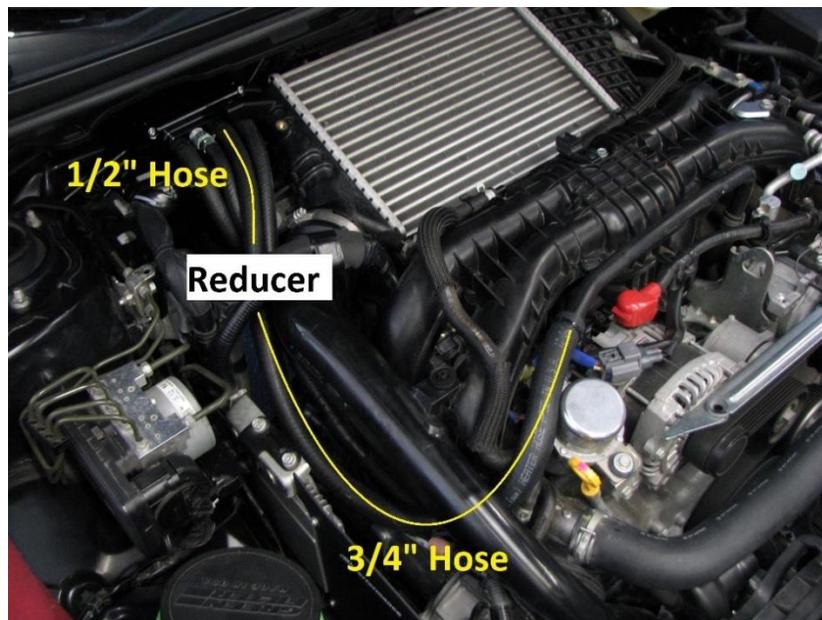
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- 2.17.** Next, we will be routing the hoses for the engine breather side. To do this we will cut the one time use clamp that the OEM uses. Use a cut off wheel or Dremel tool. Be careful not to cut through the hose or the plastic tube. Disconnect the hose once the clamp is removed.



- 2.18.** Using the 3/4" hose connect it to the plastic tube that is now open.

- 2.18.1.** Connect a 3/4" to 1/2" reducer to the other end of the hose, and route it underneath the charge pipe and main electrical harness.
- 2.18.2.** Cut an approximately 9" long piece of 1/2" hose, and connect the reducer to the AOS barb next to the PCV valve.



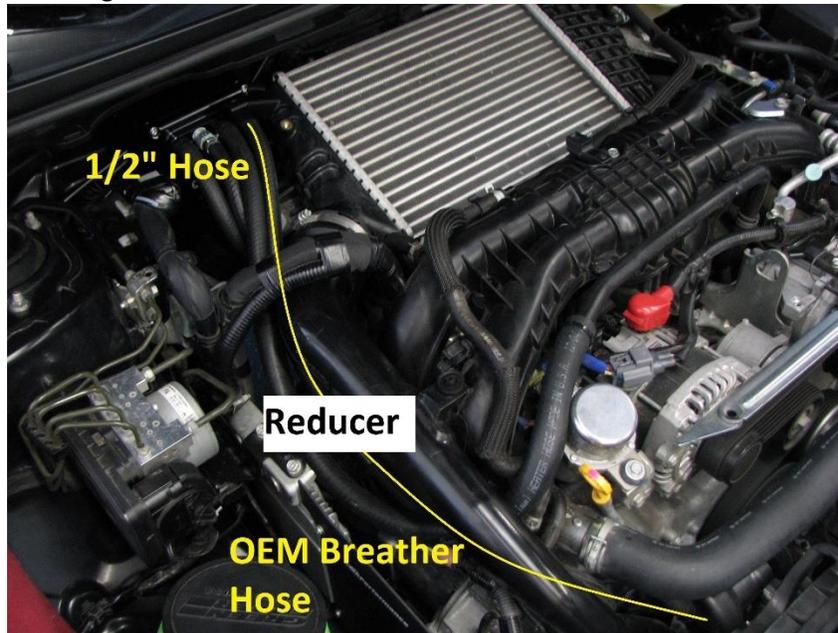
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2.19. Using the second 3/4" to 1/2" reducer, we will connect the open engine breather hose to the AOS.

2.19.1. Connect the breather hose to the reducer.

2.19.2. Cut an approximately 14" long piece of 1/2" hose, and connect the last remaining AOS barb to the reducer.



2.20. Final hose routing is ultimately up to you. However you decide to route the hoses just make sure they are not kinked or smashed. You may also, at this point, secure the hoses with zip ties or clamps.

2.21. Reinstall the OEM parts in reverse order.

2.22. Congratulations on installing VA WRX AOS with optional drain back and, coolant add-on kit!

2.23. For any questions or comments, please send us an e-mail at sales@verus-engineering.com.

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****Optional Coolant Add-on Kit install******3. Coolant Add On Install**

- 3.1.** The cooling plate will need to be sandwiched between the mounting bracket and the AOS assembly. Start by making sure the o-ring is sitting correctly in the groove as shown.



- 3.2.** Once the o-ring placement is verified, place the cooling plate onto the AOS assembly. Place the mounting bracket on top of that and use seven 16mm long M6 BHCS with washers to bolt the three pieces together. Torque to 6 ft-lbs. ****Make sure the o-ring does not get pinched when tightening the bolts down.****

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- 3.3.** With the bracket, AOS, and coolant add on plate bolted together we will need to install the banjo fittings. Currently snug these down so that the barbs stay in place, do not torque them down at this time. Use the picture below as a guide for the correct clocking of the banjo fittings. For reference, the barbs are pointing towards the driver side on a USDM car.



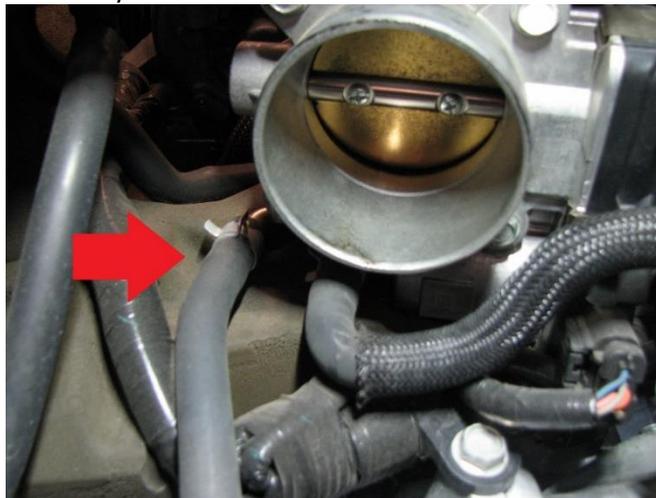
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- 3.4. We will temporarily bolt the AOS with bracket onto the fire wall with two M4 BHCS and washers.
- 3.5. Next, we will need to tap the cooling system at the throttle body.
- 3.6. Make reference marks on the throttle body coupler to make re-installation easier, and remove using a flathead screw driver.
- 3.7. Clamp both coolant hoses going to the throttle body using some hose pinchers or needle nose vice grips. This will help reduce the amount of coolant leakage when we remove the hose.



- 3.8. Stuff a paper towel or rag under the coolant hoses to catch any coolant that leaks out.
- 3.9. Completely remove the hose shown below. The other side of the hose should run to a hard pipe just behind the cylinder head.



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- 3.10. Using the provided 5/16" heater hose, cut two lengths going from the hard pipe to the AOS and the throttle body to the AOS. One hose for each barb fitting. Think about how you want to route the hoses before you cut them. We chose to route them along the A/C line close to the fire wall
- 3.11. Once the hoses are cut to the correct length, remove the AOS and bracket from the fire wall. Attach both lengths of hose to their respective barb fittings using the provided hose clamps.
- 3.12. Tighten the clamps.
- 3.13. Tighten the banjo bolts down making sure they are still oriented the correct way.
- 3.14. Install the AOS and bracket back onto the fire wall, and connect your hoses to the throttle body points we opened up in 3.7-3.9 using two more of the provided hose clamps.
- 3.15. You may route your hoses and zip tie them now as we will not be revisiting them again.
- 3.16. Continue on with the install manual at 2.10.

Optional Drain Back Kit Install**4. Drain Back Kit Install**

- 4.1. Start by unscrewing the plug at the bottom of the AOS.
- 4.2. Swap the o-ring over from the knurled plug fitting to the new threaded adapter with the through hole shown below.



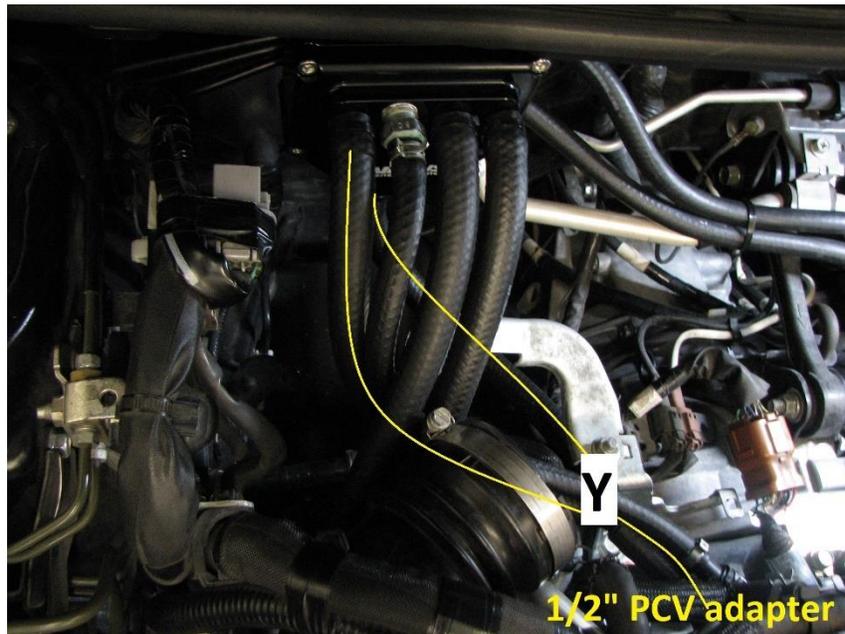
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- 4.3. Then, install the black 6AN to 1/2" barb into this and torque to 8 ft-lbs. A photo of this is shown below. **When installing the black 6AN to 1/2" nipple, do so with the knurled fitting already installed on the AOS.**



- 4.4. Cut an approximately 6" piece of 1/2" hose and attach it to the engine block adapter we installed in 2.11.
- 4.5. Attach the 1/2" Y adapter to the other end of the hose.
- 4.6. Cut two pieces of 1/2" hose approximately 12.5" long, and connect both to the Y adapter.



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- 4.7.** Connect one hose to the AOS drain back fitting we installed in **4.3**. Connect the other hose to the passenger side barb fitting on the AOS.

- 4.8.** Move back to step **2.16** to finish the remainder of the AOS install.